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1727 KING STREET
ALEXANDRIA, VIRGINIA 22314-2700
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REMARKS

The Office action of July 7, 2008, has been carefully considered.

Objection has been raised to the specification, and subject matter headings have now been added.

Claims 1-3 have been rejected under 35 USC 103(a) over Wagenbach et al in view of Deutsch et al.

The claims have now been entirely rewritten in order to place them in proper form for U.S. practice. Claim 14 replaces Claim 1 and is directed to a method for welding electric conductors using ultrasound, in which the conductors are introduced into a compression chamber that is bounded by at least two boundary elements and the compression chamber is closed and the wires welded by applying ultrasound by a first boundary element which is a sonotrode. The conduits are acted upon during welding by pressure via the sonotrode or a second boundary element. After welding, the compression chamber is decompressed and then ultrasound is applied to the welded conductors and a characteristic magnitude of the compression chamber is measured.

In the ultrasonic welding of a node, several wires, particularly stranded copper wires are placed into a compaction chamber, compacted and then brought into relative vibration towards one another by ultrasound. The friction of the strands among one another leads to welding of the surfaces so that a solid node or splice is obtained by the welding. During the compaction and welding, the volume of the compaction chamber diminishes and this change in volume can be measured by displacement pickups and used as a comparison value for checking the quality of the node obtained. The strength of the node is the decisive quality criterion for the ultrasonic welding process.

The quality of the welding according to the invention is determined directly in the compaction chamber without additional apparatus being required. After the welding, the chamber is decompressed and a short ultrasonic impulse is applied to the weld. If the weld is not solid, the conductors that have been placed in vibration will travel toward the boundary of the decompressed compaction chamber. The boundary can consequently yield such that a relatively large change in path of the second element takes place on the basis of the pressure applied continuously by the second element, such as a counter electrode or anvil. This measurement of the change in path, which can be recorded via a displacement pickup provides information as to whether or not the welding meets quality standards. If only a slight change in path takes place, it can be concluded that the weld has the necessary or required strength.

Decompaction generally means that, for example, a boundary or jaw of the compaction chamber is unlatched or released, such that the jaw is displaced on the basis of the splice becoming soft, yielding to the pressure of the second element, to the extent that the splice does not have the requisite strength. As a result of the yielding of the boundary element, the soft splice almost flows, and that the second element is correspondingly shifted in the direction of the first element. Consequently, a characteristic change in path of the jaw takes place when the splice is not sufficiently strong. The yielding of the boundary element, its change in path, can also be used as a characteristic value for drawing conclusions about the quality of the splice.

By selecting suitable parameters, for example, pressing force, amplitude or duration of sound, it is possible to differentiate on the basis of the amount of change in path, whether or not the weld or splice is firm and thus whether or not it satisfies the quality standards.

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The Wagenbach et al reference relates to a method for compaction and subsequent welding of electric conductors. Wagenbach et al solves the problem of gain parameters during the welding process, which can be checked as to whether or not the welded products lie within acceptable production tolerances. For this purpose, the parameters determined during the welding process are compared with parameters to be derived from curves, and the weld is evaluated by comparison of the parameters determined during welding with the curves.

Wagenbach et al clearly does not disclose or suggest releasing the pressure of the compaction chamber, then applying further ultrasound to the welded conductors and measuring a characteristic magnitude of the compression chamber. However, Deutsch et al has been cited by the Office action, attempting to supply the missing features. Deutsch et al, however, does not relate to ultrasound welding, but rather to resistance welding in which the weld quality is checked by application of ultrasound. According to the Deutsch et al process, during a period when the workpieces are mechanically pressed between electrodes and before welding current is initiated, the weld workpiece is subjected to ultrasound to obtain to obtain a first measured value. Subsequently, the ultrasound is interrupted and the wires are welded by current flow. Subsequent to the welding, and while the pressure of the electrodes against the workpiece is maintained during a cooling period, ultrasonic energy is once again transmitted through the electrodes and the welding zone to measure the transmitted ultrasonic energy, to obtain thereby a second measured value. These first and second measured values are compared, and the result is an indication of the quality of the pressure weld.

Even if one were to combine Deutsch et al with Wagenbach et al, the result would not be the claimed invention. Note that the invention does not utilize a first ultrasonic

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measurement before welding, to which a second measurement is compared. Moreover, in the claimed invention, the pressure of the compression chamber is released before application of the ultrasound to determine the characteristic magnitude of the compression chamber. Deutsch et al does not release this pressure, nor does Deutsch et al measure the characteristic magnitude of the compression chamber.

Withdrawal of this rejection is requested.

Claim 4 has been rejected under 35 USC 103(a) over Wagenbach et al in view of Deutsch et al and further in view of Steiner et al. Steiner et al has been cited to show the use of a displacement pickup, which is otherwise known in the art, but does not cure the defects of the Wagenbach et al and Deutsch et al references. Withdrawal of this rejection is requested.

Claims 5-8 and 10-13 have been rejected under 35 USC 103(a) over Wagenbach et al in view of Deutsch et al and further in view of Eder et al. Wagenbach et al and Deutsch et al have been discussed in detail above.

Eder et al has been cited to show non-destructive testing of welded conductors by applying pressure to the structure of the weld and checking the uncoiling of the conductors made up of strands of wire welded to each other.

Eder et al does disclose producing welded conductors by means of ultrasound, but after welding, the conductors are placed into a separate apparatus comprising nesting jaws and a testing force is applied to at least two shell surface segments of the welded assembly. The apparatus has approximately the same effect as a pair of pliers for testing the welded joint and forces are to be applied without the occurrence of noticeable notch effects.

Even if the welding is achieved by means of ultrasound according to Eder et al, the ultrasound welding device is not used to check the quality of the weld. According to the

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invention, however, the welded conductors must remain between the first and the second elements after the decompression, so that the renewed application of ultrasound can be applied with simultaneous action of pressure on the welded conductors. There is nothing at all in the Eder et al reference which would suggest that one of ordinary skill in the art that such pressure should be applied while the wires remain in the compression chamber, especially since Eder et al does not even remotely suggest simultaneous action of ultrasound and pressure, as recited in claim 19. The only means by which Eder et al could be combined with Deutsch et al and Wagenbach et al is by previous knowledge of the claimed invention.

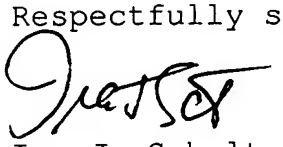
Withdrawal of this rejection is requested.

Claim 9 has been rejected under 35 USC 103(a) over Wagenbach et al in view of Deutsch et al and Eder et al, and further in view of Peter. Peter relates to an ultrasonic welding control utilizing a timer to determine when power input exceeds a power threshold. Such teaching is totally unrelated to that of the claimed invention and does not cure the defects the other cited references.

Withdrawal of this rejection is requested.

In view of the foregoing amendments and remarks, Applicant submits that the present application is now in condition for allowance. An early allowance of the application with amended claims is earnestly solicited.

Respectfully submitted,



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